Application No.: 10/723942 Docket No.: SIW-074

REMARKS

Applicants amend claims 1-2 and add new claim 3. Claims 1-3 are presently pending, of which claims 1 and 2 are independent. Claims 1 and 2 are rejected under 35 U.S.C. §103(a) as being unpatentable over United States Patent No. 6,458,478 to Wang et al. (hereafter "Wang") in view of United States Patent No. 6,480,767 to Yamaguchi et al. (hereafter "Yamaguchi"). For the reasons set forth below, Applicants respectfully submit that the pending claims define over the art of record.

Claim Objections

The Examiner notes on page 2 of the Office Action that minor informalities exist in the claims. In response, Applicants amend claims 1 and 2 and respectfully submit that the claim amendments address all of the Examiner's concerns. Applicants accordingly request the Examiner to reconsider and withdraw the objections to the claims.

The Claimed Invention

The claimed invention is related to a control apparatus for a fuel cell vehicle that can improve the energy efficiency of a fuel cell vehicle during regeneration by the propulsion motor. During deceleration of a vehicle, the propulsion motor functions as a generator and produces the so called regenerative braking power, recovering the kinetic energy of the vehicle in the form of electrical energy. The control apparatus includes a regenerative electric power calculating device which calculates the regenerative electric power which can be generated by the regenerative operation of the propulsion motor. The control apparatus also includes an output control device which controls an output current of a fuel cell. The control apparatus further includes a pressure detection device which detects the pressure of the reactant gas supplied to the fuel electrode of a fuel cell.

During regeneration of the propulsion motor, the power generation of the fuel cell and the regenerative electric power can be controlled such that unnecessary power generation stops and the energy efficiency of the fuel cell does not drop. Additionally, the detection of the reactant gas pressure makes it possible to prevent the excessive increase of the voltage between

both terminals of the fuel cell and also prevent the fuel cell current from being excessively extracted.

Claim Rejection Under 35 U.S.C. §103

Claims 1-2 are rejected as being obvious over the Wang reference in view of the Yamaguchi reference. To establish a prima facie case of obviousness, the prior art references, either alone or in combination, must teach or suggest each and every limitation of the rejected claims. Applicants respectfully submit that neither the Wang reference nor the Yamaguchi reference teaches or suggests the limitations of a *regenerative electric power calculating device* which calculates the regenerative electric power which can be generated by the regenerative operation of the propulsion motor and an *output control device* which controls an output current of a fuel cell, as required by both claims 1 and 2.

The Examiner agrees on page 4 of the Office Action that the Wang reference does not teach the limitation of a regenerative electric power calculating device, but suggests that the Yamaguchi reference suggests such a device in col. 5 lines 54-65. In this cited section, Yamaguchi discusses a calculator that calculates the electric power of a battery from the current coming in or out from the battery and the voltage between the battery terminals. One skilled in the art will recognize that the current and the voltage can be simply obtained by using an ammeter and a voltmeter. However, the regenerative electric power calculating device of the claimed invention calculates the regenerated electric power converted from the kinetic energy of the propulsion motor. The propulsion motor can be made of a permanent magnet, and there is no voltage that can be measured by using a voltmeter between the two ends of the permanent magnet. Therefore, Applicants respectfully submit that the electric power calculation method cannot be used to calculate the regenerative electric power of the claimed invention. Accordingly, Applicants respectfully submit that neither the Yamaguchi reference nor the Wang reference teaches or suggests a regenerative electric power calculating device which calculates the regenerative electric power which is generated by the regenerative operation of the propulsion motor, as recited in claims 1 and 2.

The Examiner then postulates that a thermoelectric reformer of the Wang reference is equivalent to the output control device of the claimed invention. However, the output control

device of the claimed invention controls an *output current* of a fuel cell, whereas only part of the electricity generated by a fuel cell is inputted to the thermoelectric reformer since a part of the electricity generated by the fuel cell is directed to an electricity storage device. *See* Wang Col. 6, lines 27-30 and Fig. 1. Therefore, the Wang reference does not teach or suggest an output control device that controls an output current of a fuel cell. It appears to us that nowhere does the Yamaguchi reference mention an output control device that controls an output current of a fuel cell. Applicants respectfully submit that the Wang reference and the Yamaguchi reference, either alone or in combination, do not teach or suggest an output control device that controls an output current of a fuel cell.

Additionally, claim 2 recites the limitation of *a pressure detection device* which detects the pressure of the reactant gas supplied to the fuel electrode of a fuel cell. The Wang reference discusses inlet and outlet pressure measurements of a water-gas shift reactor. However, as can be seen in Fig. 1 of the Wang reference, water-gas shift reactors 20 and 22 are far from the fuel cell 50 and cannot measure the pressure of the reactant gas supplied to the fuel cell. Furthermore, gas pressure might have changed after the gas mixture passes through the hydrogen separator 40 and the condenser 34. Therefore, the Wang reference does not teach or suggest a pressure detection device which detects the pressure of the reactant gas supplied to the fuel electrode of a fuel cell, as recited in claim 2. Applicants respectfully submit that the Yamaguchi reference does not discuss a pressure detection device.

Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the rejections of claims 1 and 2.

The New Claim

New claim 3 is dependent on claim 2 and includes all the limitations of claim 2. Claim 3 recites how the output control device responds under the situation when the chargeable power is less than the regenerative electric power and the pressure of the reactant gas at the fuel electrode of the fuel cell is greater than a predetermined pressure. Applicants respectfully note that claim 3 recites separate patentable subject matter. As such, for this and the reasons set forth above, claim 3 also defines over the art of record.

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CONCLUSION

In view of the above amendment, Applicants believe the pending application is in condition for allowance.

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Respectfully submitted,

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